An Energy Strategy for Yukon
Priority Action:

Yukon Transportation Sector
Information Paper

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Energy, Mines and Resources

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1. Background

Yukon government's vision is for a sustainable and secure energy sector that is environmentally, economically and socially responsible.

A comprehensive Energy Strategy has been developed to guide future decisions on energy in the Territory.

Improving energy efficiency and conservation is a consistent theme in the Strategy. The transportation sector was identified as a significant contributor to energy consumption and greenhouse gas emissions in the territory. In order to inform future policy in this sector a priority action was identified in the Strategy to undertake a study of Yukon's transportation sector in an effort to identify strategic opportunities to improve energy efficiency and conservation.

This paper presents the findings of this study and will be used to educate and inform stakeholders involved in policy and program development in the transportation sector. These stakeholders include, but are not limited to, fleet managers, planners, educators, policy makers in Yukon government, the City of Whitehorse, municipalities, First Nations and interested parties in the private sector.

2. Trending Topics in the Transportation Sector

Canada's transportation infrastructure has more than 1.4 million kilometres of roads, as well as 72,093 kilometres of operating railroad tracks, 300 commercial ports and harbours, 10 major international airports and 300 small airports.

In 2004 transportation activities generated more than one-quarter of Canada's greenhouse gas (GHG) emissions and accounted for 28% of their growth from 1990 to 2004 during which time GHG emissions from transportation increased 30%, the equivalent of almost 45 million tonnes.

At the same time, emissions of *some* smog-forming pollutants have been on the decline, largely due to the use of catalytic converters in vehicles and cleaner burning fuels. Emissions of nitrogen oxides from transportation were 19% lower in 2004 than they were in 1990. During the same period, emissions of carbon monoxide and volatile organic compounds each dropped 37%. Even with these pollution reductions, transportation remains a major emitter of air pollutants in and around urban areas. More than one-half of all nitrogen oxides, a quarter of volatile organic compounds and upwards of 17% of fine particulate matter came from transportation activities in 2004.

Recent fluctuations in the price of oil along with increased awareness of the causes and impacts of climate change have resulted in some significant changes to the way in which North Americans view transportation. To meet the needs of this changing consumer attitude automakers are making considerable efforts to green their production lines while policy makers are rethinking North America's car-centric lifestyle.

The trend in the automotive industry is to increasingly energy efficient vehicles with many manufacturers contributing significant resources to the development of zero emissions electric vehicles.

Along with the private sector, policy makers worldwide are also increasingly inclined to develop policy focused on reducing energy consumption in the transportation sector. Some of the common themes in policy actions are:

- traffic demand management, (curbing use of private automobiles)
- improved urban planning to reduce sprawl
- improved public transit services
- improved 'active' transportation networks and incentives
- increased spending on public transportation
- new technologies and new, cleaner fuels
- Intelligent Transportation Systems
- anti-idling programs for fossil fuel vehicles
- driver education targeted at specific fleets
- emissions testing and regulations

3. Yukon Transportation Sector Baseline Information

The following baseline information was collected through numerous municipal, territorial and federal sources. For further details see source information provided in Appendix A.

3.1. Yukon Transportation Infrastructure[1]

Yukon transportation is largely focused on road and air access, in providing service to its 35,944 residents spread out over 483,000 square kilometres and 17 communities.

Yukon maintains 4,800 kilometres of road, giving it the third smallest road system of any jurisdiction in the country, only ahead of NWT and Nunavut. Within this highway system, 250 kilometres are paved and 1,900 kilometres surfaced with bituminous surface treatment (BST), a thin asphalt membrane. The remainder is gravel. All Yukon communities, except one, are connected by this system (Old Crow, Yukon's most northerly community is accessible only by air).

Given its small population base, Yukon has the highest per capita road network in the country with more than 155 kilometres of road for every 1,000 residents. The busiest section of Yukon highways, in and around Whitehorse, sees about 3,700 vehicles per day. The stretch of the Alaska Highway from Whitehorse south-east to Watson Lake carries approximately 700 vehicles per day. Most other Yukon highways see traffic in the 100-150 vehicles per day range. Traffic patterns throughout the territory are largely seasonal with the largest traffic volumes occurring in the summer tourist season.

[1] This section is adapted from Yukon Highways and Public Works, *Prospecting Corridors to Growth – A Transportation Vision for Yukon*, Spring 2006.

The Yukon airport system contains one national, two regional and 10 community airports, as well as 16 aerodromes. These facilities are exclusively operated by the Government of Yukon. Yukon is serviced by three scheduled carriers – Air Canada, Air North, First Air and West Jet – as well as several local and international charter companies. Some 200,000 passengers travel through the Whitehorse International Airport each year, making its size comparable to that of the airport serving Saint John, New Brunswick.

Historically, the White Pass and Yukon Route (WP&YR) provided passenger and freight rail service from Skagway, Alaska to Whitehorse, Yukon; however, this service ended in 1982. The line was reopened from Skagway to Lake Bennett, British Columbia, as a tourist attraction in 1988 and later on to Carcross, Yukon. A study has recently been completed investigating a possible rail link from Alaska and Yukon to the broader North American rail grid.

3.2. Transportation Related Emissions

3.2.1. Greenhouse Gas Emissions:

The National Inventory Report on greenhouse gas emissions shows in 2008 that, at 203 kilotonnes of CO_{2e}, transportation makes up approximately 58% of the territory's emissions (Figure 1). This makes transportation the single largest source of greenhouse gas emissions in the territory.

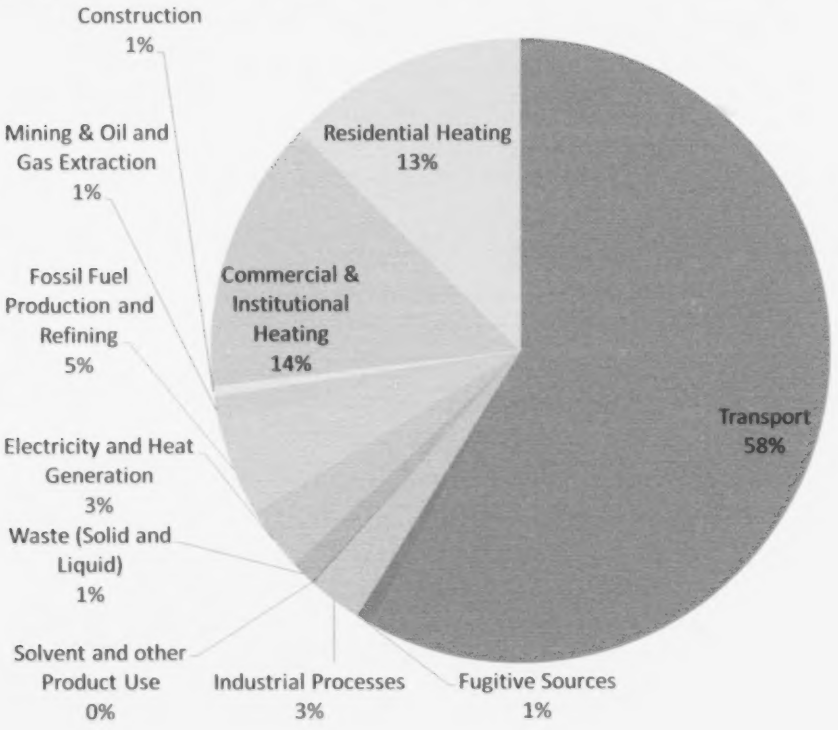

Construction 1%
Mining & Oil and Gas Extraction 1%
Fossil Fuel Production and Refining 5%
Electricity and Heat Generation 3%
Waste (Solid and Liquid) 1%
Solvent and other Product Use 0%
Industrial Processes 3%
Fugitive Sources 1%
Residential Heating 13%
Commercial & Institutional Heating 14%
Transport 58%

Figure 1: 2008 Greenhouse gas emissions in Yukon by source

Of the 203 kilotonnes of transportation related greenhouse gas emissions, 62% is made up of road transportation with 12% coming from domestic aviation and 26% off-road transportation including large equipment for construction and industrial purposes (Figure 2).

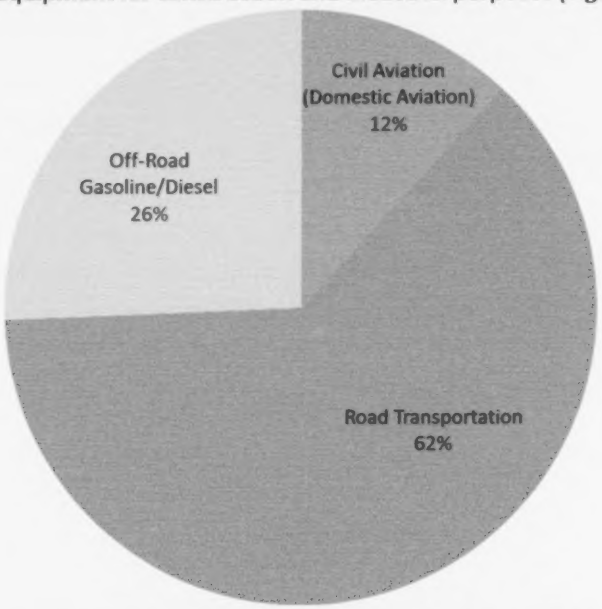


Figure 2: 2008 Transportation Greenhouse gas emissions in Yukon by source

Road transportation emissions can be further broken down by vehicle type as in Figure 3, below. This figure show that 63% of the territory's 2008 Road Transportation Emissions are associated with large freight trucks with 35% coming from light duty gasoline, diesel and propane vehicles.

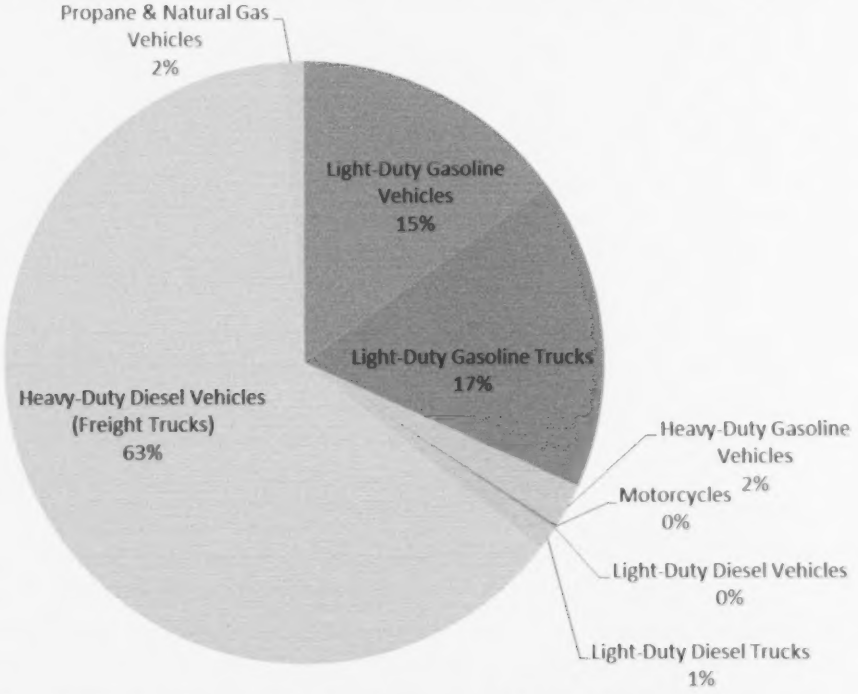
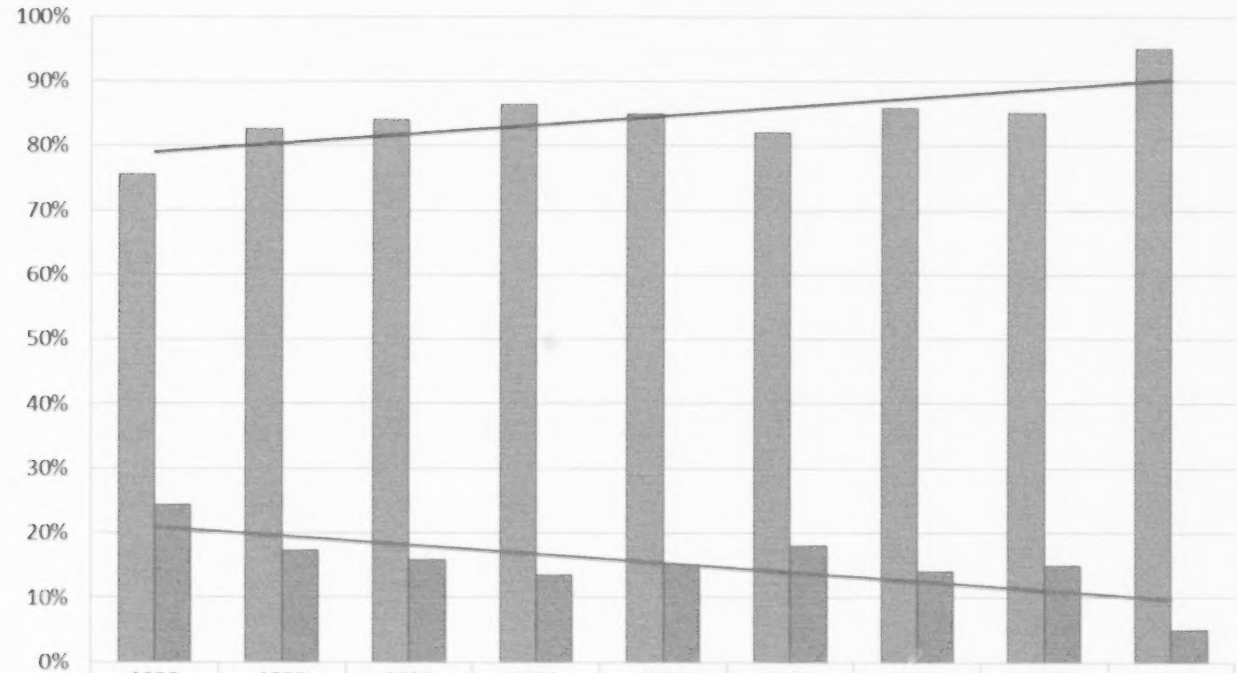


Figure 3: 2008 Road Transportation Greenhouse gas emissions in Yukon by Source

3.2.2. Other Transportation Related Pollutants:

The Whitehorse Vehicle Emissions Clinics held in 1998-2004, 2007 and 2009 show that transportation-induced carbon monoxide and hydrocarbon pollution are dropping as newer vehicles with better emission controls are driven by more people (Figure 4). Environment Canada's research shows that on average, older vehicles emit 19 times more smog forming pollutants (Nitrogen Oxides and Volatile Organic Compounds) than models built in 2004 or later.



	1998	1999	2000	2001	2002	2003	2004	2007	2009
Pass (%)	76%	83%	84%	86%	85%	82%	86%	85%	95%
Fail (%)	24%	17%	16%	14%	15%	18%	14%	15%	5%

Figure 4: Yukon Emissions Clinic Multi-year Results

3.3. Transportation to Work

The Canadian census data from 1996 and 2006 (Figure 5) show that the majority of Yukoners use conventional single occupancy vehicles as their means of transportation to and from work.

In the 10 years between 1996 and 2006 a slight increase has been seen in single occupancy transportation and a decrease in walking to work and carpooling. Respondents' use of bicycles has increased slightly over this time from 2% to 3%.

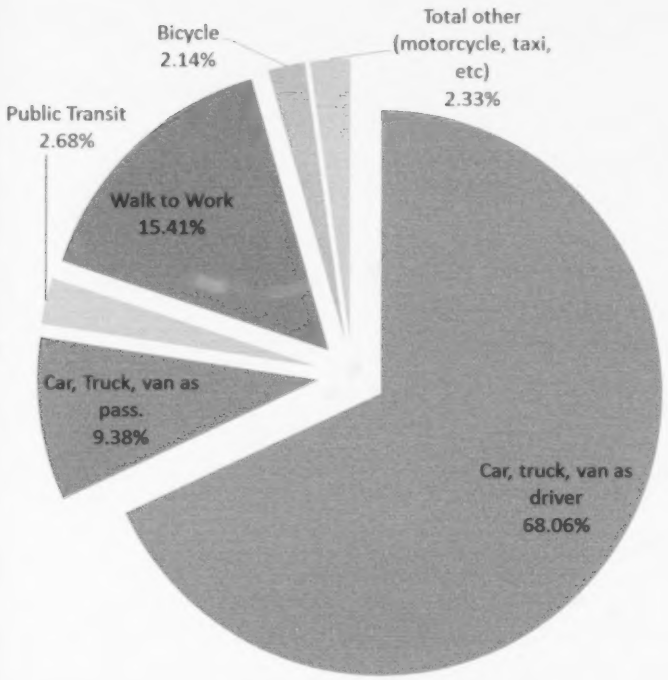


Figure 5a: 1996 Canadian Census: Yukon Mode of Transportation to work

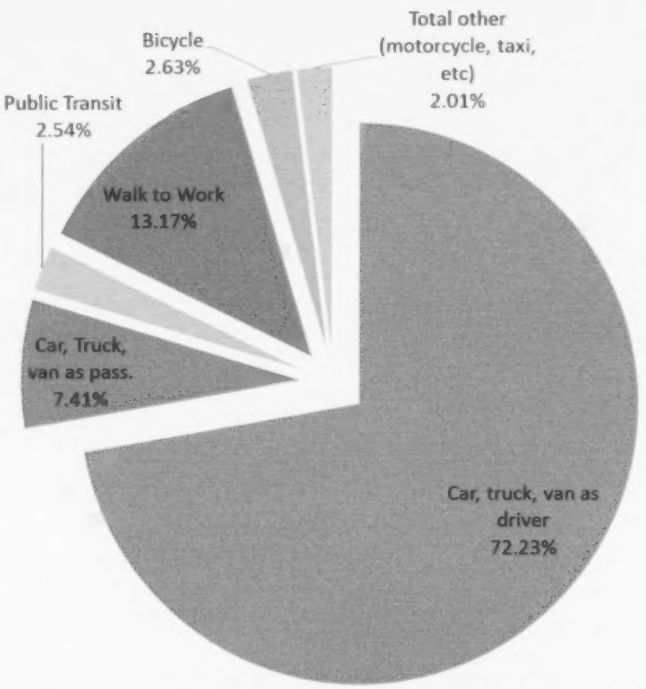


Figure 5b: 2006 Canadian Census: Yukon Mode of Transportation to work

Comparisons of Whitehorse, Yukon communities and Canada as a whole show that a significant percentage of respondents in communities outside of Whitehorse walk to work resulting in significantly lower single occupancy numbers than either Whitehorse or Canada (Figure 6).

Conversely, Whitehorse respondents show a higher use of single occupancy vehicles as a means of getting to work than the Canadian average and significantly higher than the communities outside of Whitehorse.

Coinciding with the Whitehorse respondents' higher number of single occupancy transports is its relatively low public transportation use. On average Canadian respondents showed an 11% public transit use while Whitehorse respondents showed only 3.1%.

Surprisingly, given Yukon's relatively long, dark and cold winters, Yukon does show slightly higher numbers in both walking and biking to work than the rest of Canada.

Figures 7 and 8 show the Census data comparison of Canada, Whitehorse, and outside Whitehorse numbers for average/median daily commuting distances. This data clearly shows Yukon residents on average have a significantly shorter commuting distance than the average Canadian. Median commuting distances for Yukon residents is 3.9 km while the median Canadian commute is nearly twice as far at 7.6 km.

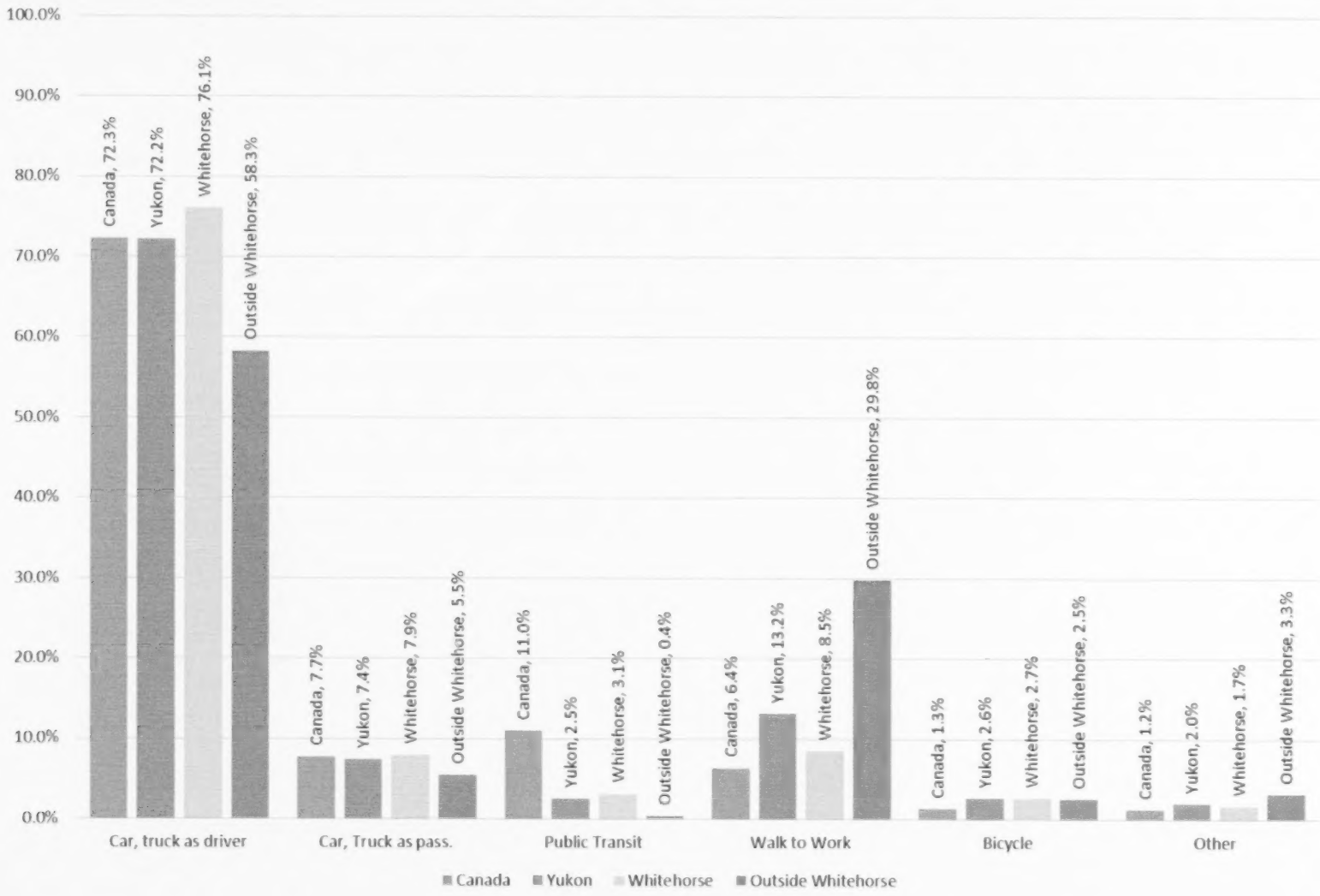


Figure 6: 2006 Canadian Census: Mode of Transportation to Work

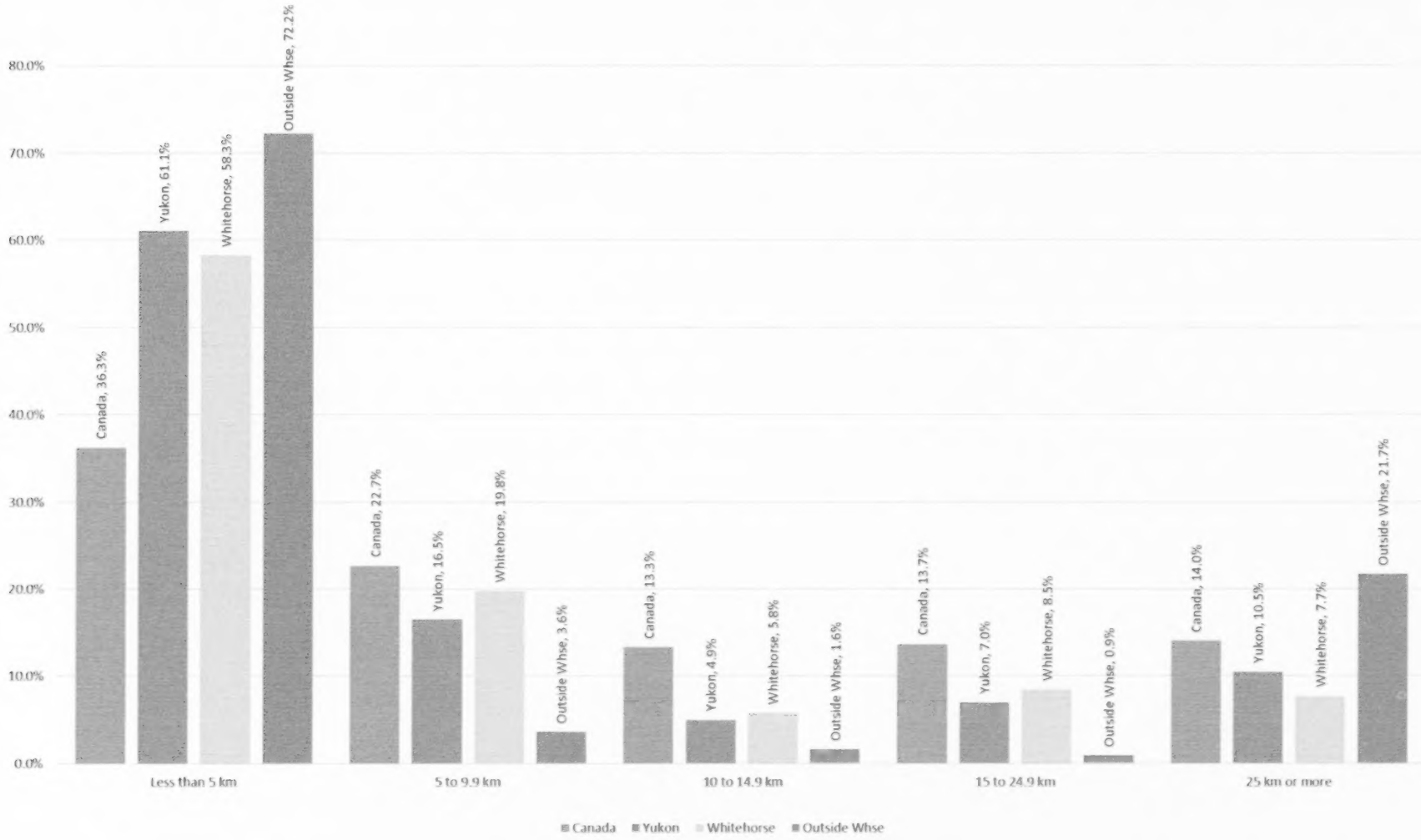


Figure 7: 2006 Canadian Census: Average Commuting Distance

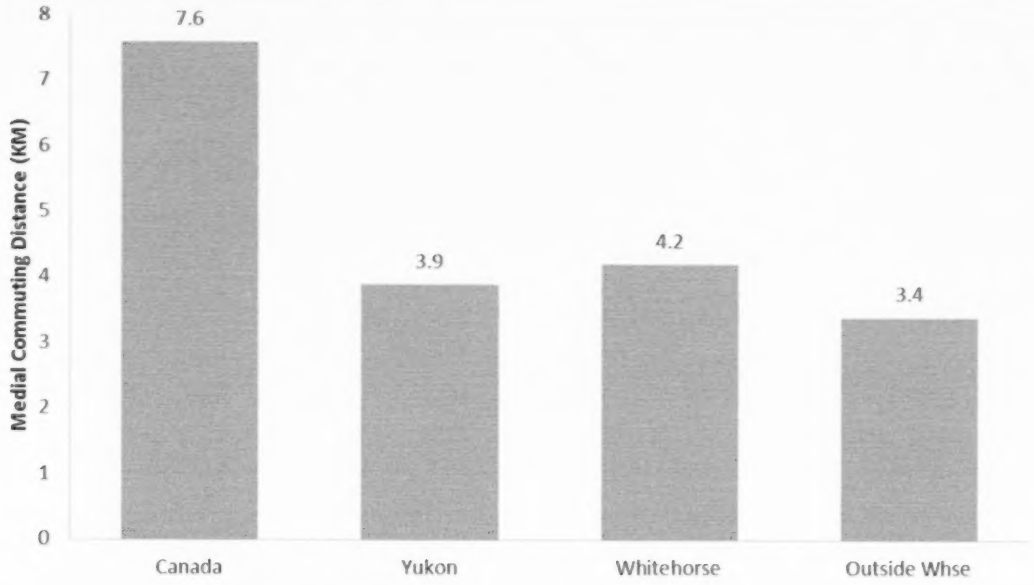


Figure 8: 2006 Canadian Census: Median Commuting Distance

3.4. Vehicle Registration in Yukon

Vehicle registration in Yukon has steadily increased since 2001. As Figure 9 shows, most vehicles registered in the territory are classified as "Vehicles up to 4.5 tonnes" (passenger vehicles).

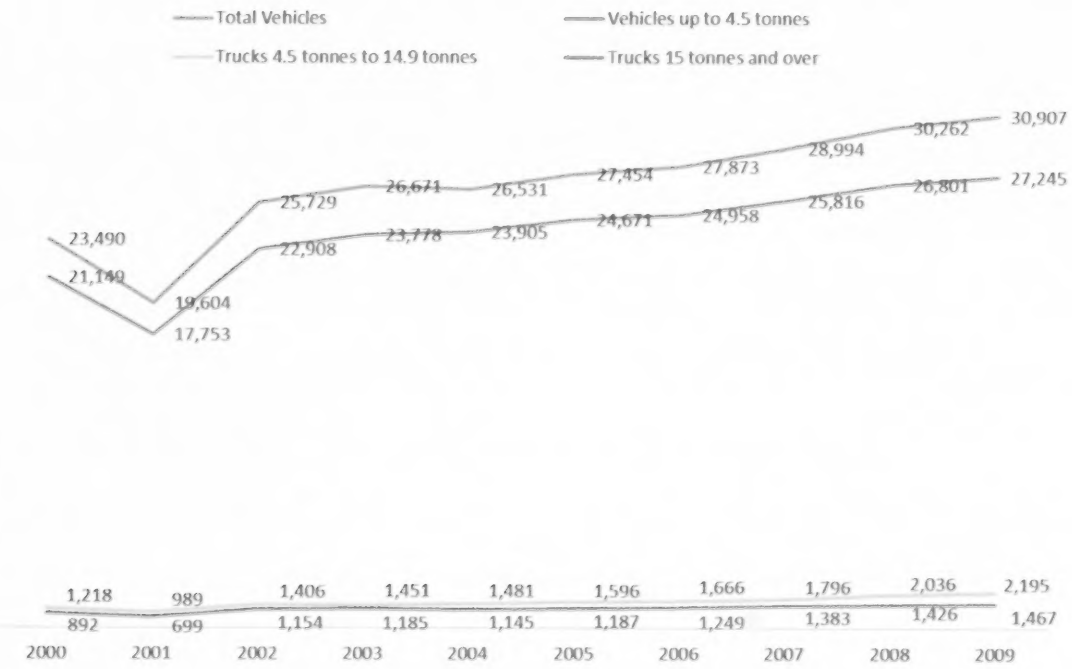


Figure 9: Statistics Canada: Vehicles Registered in Yukon

3.5. Fuel Sales in Yukon

Net sales of both diesel and gasoline have seen an increase of approximately 25% from 2003 to 2010 from approximately 101 to 125 million litres/year. (Figure 10)

Diesel sales have been the largest contributor to this increase over this period going from 37 to 55 million litres/year, an increase of approximately 39%. Net gasoline sales increased approximately 9% from 64 to 70 million litres/year.

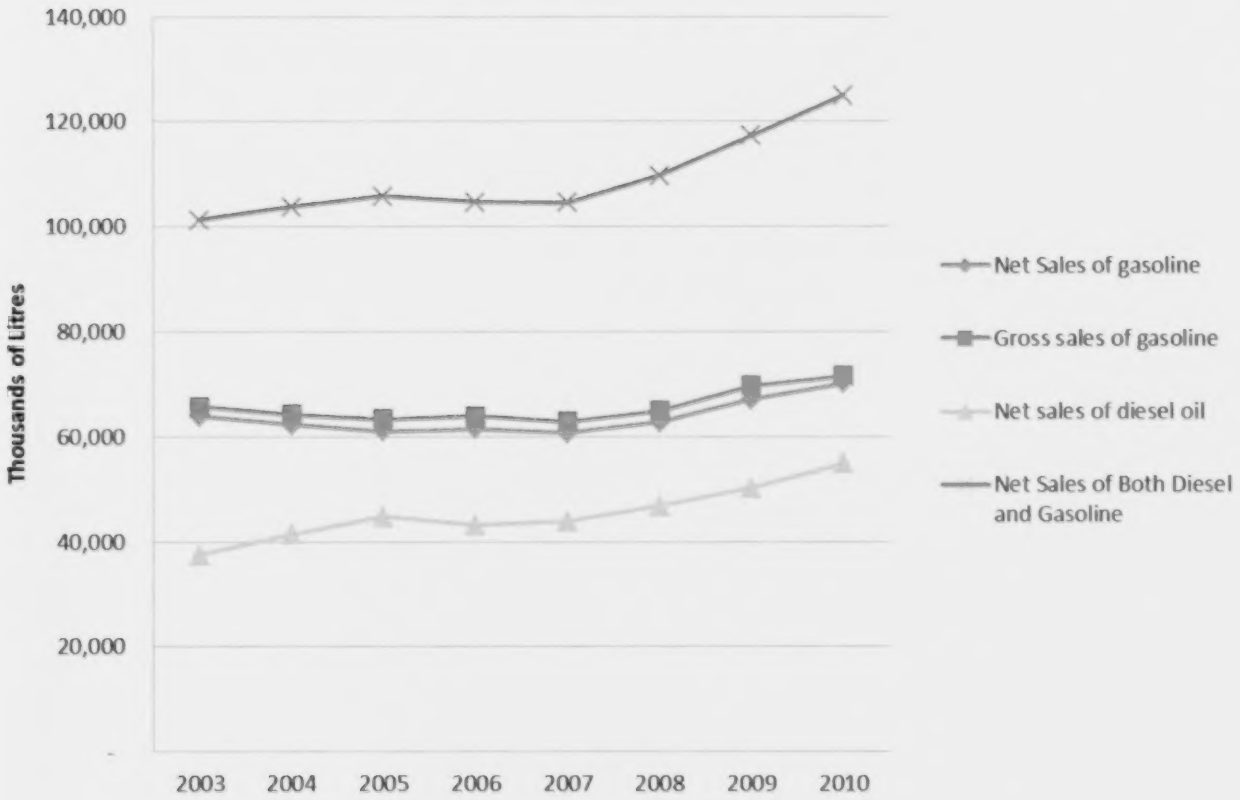


Figure 10: Statistics Canada (CANSIM Table 405): Yukon Sales of Fuel for Road Motor Vehicles

3.6. Fuel Price in Yukon

Price of both diesel and gasoline for transportation has seen a steady increase of approximately $0.04/year from 1999 to 2012. (Figure 11)

Diesel has traditionally been at a lower price than gasoline; however, both products trend at the same rate and more recently diesel prices have been slightly higher than gasoline.

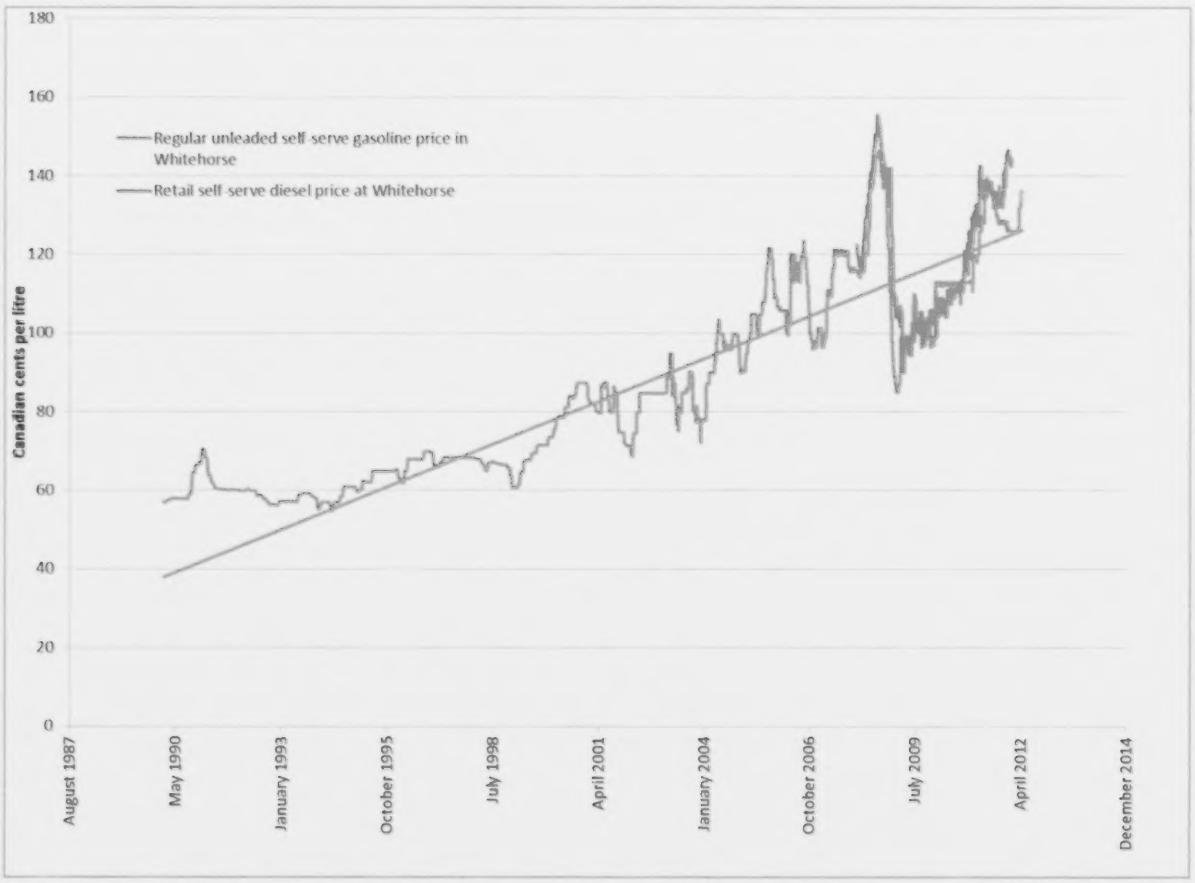


Figure 11: Yukon Bureau of Statistic: Whitehorse Transportation Fuel Cost

3.7. Household Spending for Transportation

Based on the 2009 Statistics Canada's Survey of household spending by Yukon citizens have seen a steady increase in spending associated with transportation. Figure 12 below shows an increased household expenditure in vehicle operations as well as public transportation over the past decade.

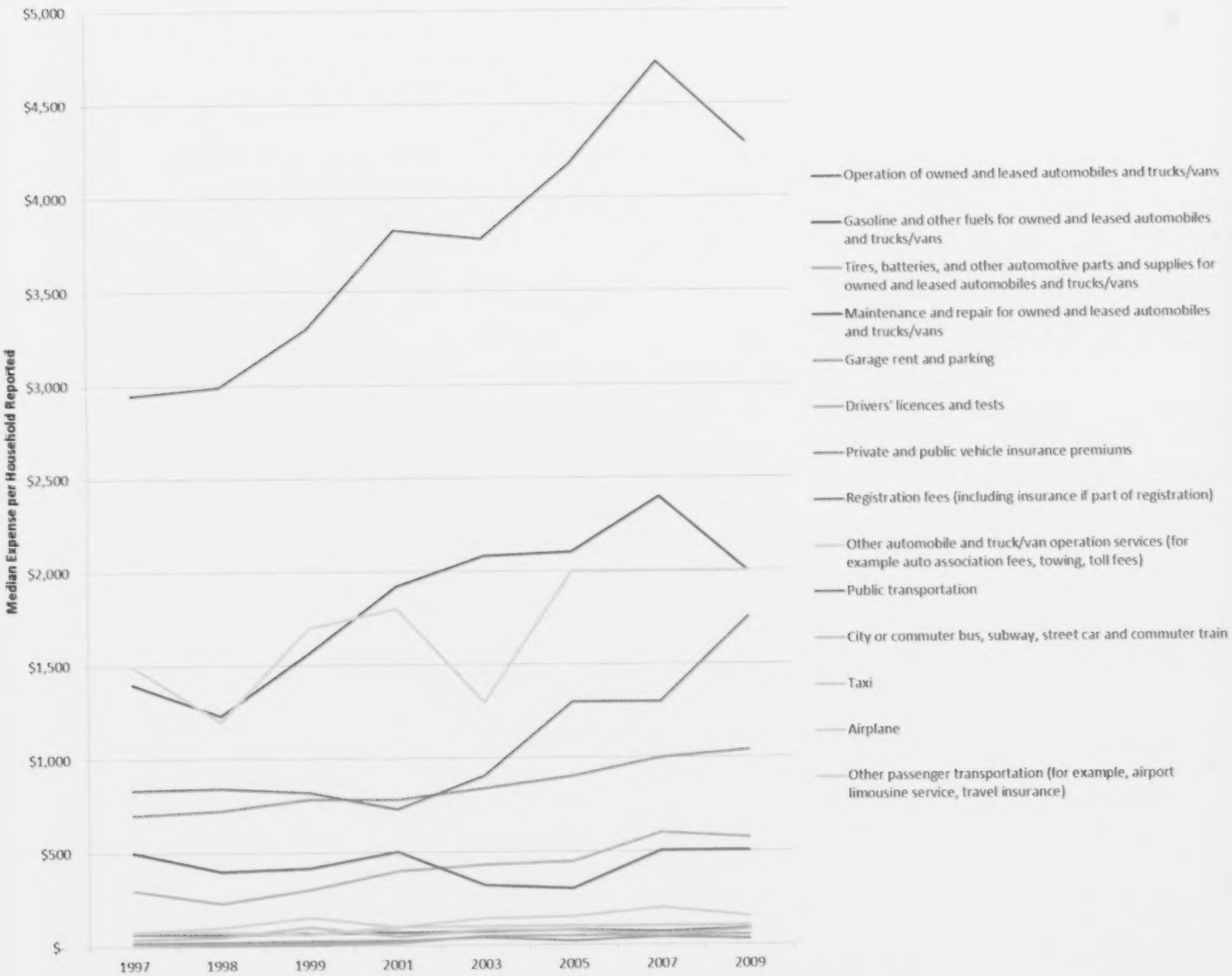


Figure 12 :Statistics Canada (Survey of Household Spending 1997-2009)
Yukon Household Transportation Spending

	1997	1998	1999	2001	2003	2005	2007	2009
Operation of owned and leased automobiles and trucks/vans	$ 2,946	$ 2,988	$ 3,298	$ 3,827	$ 3,780	$ 4,175	$ 4,720	$ 4,293
Gasoline and other fuels for owned and leased automobiles and trucks/vans	$ 1,400	$ 1,230	$ 1,560	$ 1,920	$ 2,080	$ 2,100	$ 2,394	$ 2,000
Tires, batteries, and other automotive parts and supplies for owned and leased automobiles and trucks/vans	$ 300	$ 230	$ 300	$ 400	$ 430	$ 445	$ 600	$ 570
Maintenance and repair for owned and leased automobiles and trucks/vans	$ 500	$ 400	$ 416	$ 500	$ 320	$ 300	$ 500	$ 500
Garage rent and parking	$ 20	$ 20	$ 25	$ 25	$ 40	$ 20	$ 40	$ 30
Drivers' licences and tests	$ 15	$ 10	$ 10	$ 15	$ 50	$ 50	$ 50	$ 51
Private and public vehicle insurance premiums	$ 700	$ 725	$ 784	$ 780	$ 840	$ 900	$ 1,000	$ 1,040
Registration fees (including insurance if part of registration)	$ 70	$ 61	$ 68	$ 70	$ 72	$ 80	$ 70	$ 84
Other automobile and truck/van operation services (for example auto association fees, towing, toll fees)	$ 75		$ 70	$ 89				$ 109
Public transportation	$ 836	$ 844	$ 820	$ 730	$ 904	$ 1,300	$ 1,300	$ 1,750
City or commuter bus, subway, street car and commuter train	$ 40	$ 50	$ 100	$ 50	$ 80	$ 75	$ 50	$ 80
Taxi	$ 75	$ 75	$ 60	$ 100	$ 100	$ 100	$ 100	$ 100
Airplane	$ 1,500	$ 1,200	$ 1,700	$ 1,800	$ 1,300	$ 2,000	$ 2,000	$ 2,000
Other passenger transportation (for example, airport limousine service, travel insurance)	$ 75	$ 100	$ 150	$ 100	$ 145	$ 150	$ 200	$ 150

Figure 12: Statistics Canada (Survey of Household Spending 1997-2009)
Yukon Household Transportation Spending

3.8. Transit Ridership

Currently the City of Whitehorse is the only Yukon municipality which operates a transit system. This system consist of five routes that cover all the major residential and commercial zones within the City. Since 2003 ridership for the City's buses has seen an increase from a low of approximately 320,000 trips to a maximum of 375,000 trips in 2009.

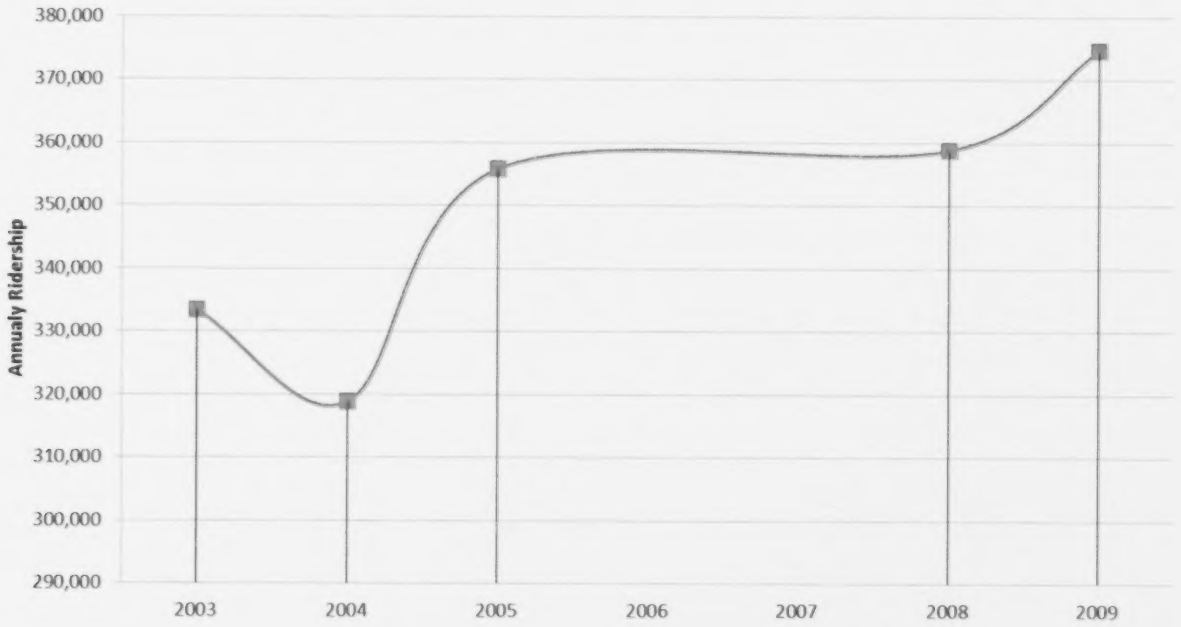


Figure 13: CUTA Canadian Transit Fact Book: Annual Ridership for Whitehorse, Yukon

Approximately 53% of transit trips take place during the colder months of October through March with the lowest trip numbers coming in the warmer summer months of June through August.

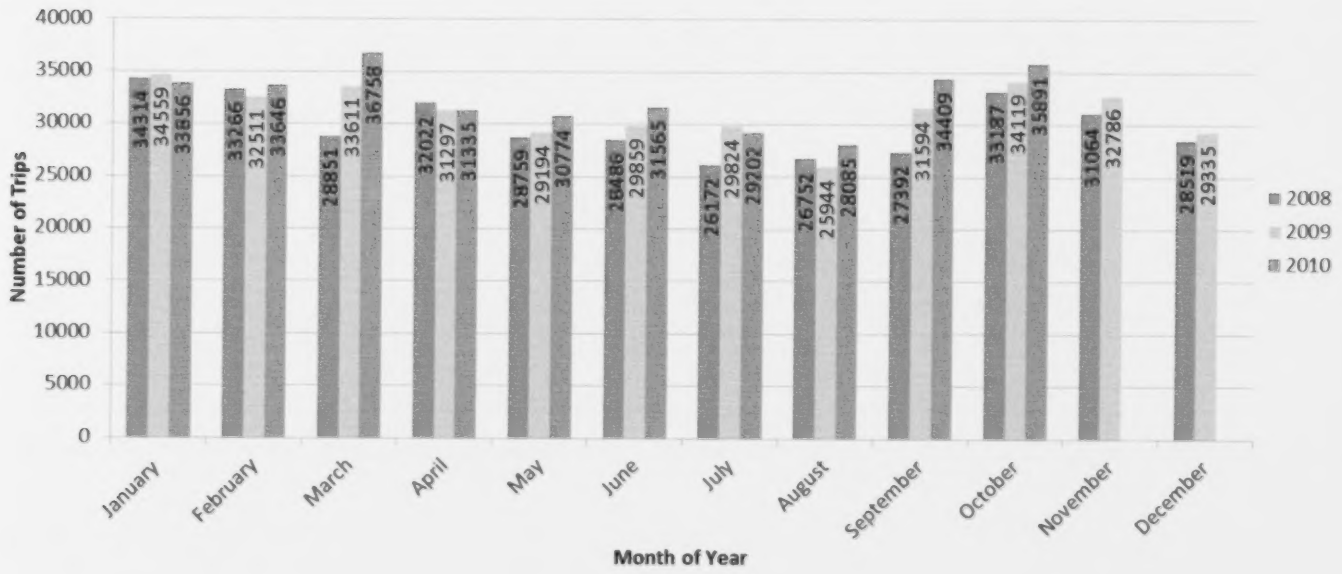


Figure 14: City of Whitehorse: Monthly Ridership 2008-2010

3.9. Cross Border Transportation

Total cross border transportation increased by approximately 10% between 2004 and 2007; however Yukon Bureau of Statistics data show this is largely due to tourism-related bus and train traffic which has increased 57% and 47% respectively. Car and truck traffic declined by 13% during the same period.

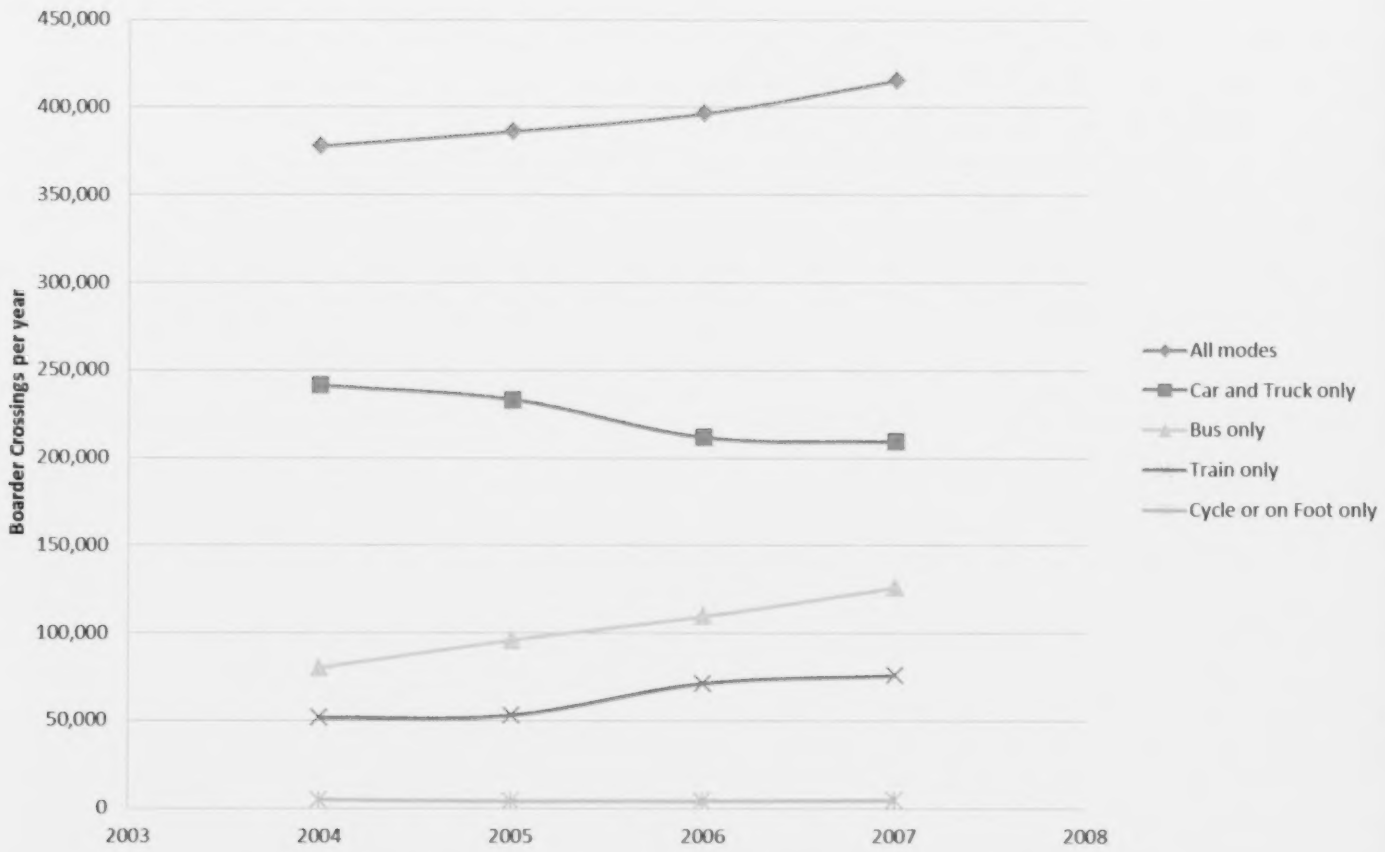


Figure 15: Yukon Government, Department of Tourism and Culture: Total Land Border Crossings

4. Insight into Public Perception

Two key surveys have been conducted related to transportation in Yukon:

1. City of Whitehorse 2008 Biennial Citizen Survey
2. 2000 "How Do You Get To Work?" Survey

Some of the key finding of this survey are listed in the sections below.

4.1. City of Whitehorse 2008 Biennial Citizen Survey

The City of Whitehorse delivers a comprehensive citizen survey every two years that seeks to gather information on any number of city related topics and services. Some of the key transportation related survey questions and responses are presented in this section.

When asked, "What do you think the City needs to focus on to better protect the environment?" 30% of respondents listed "Transit/Traffic Reduction" while 22% listed "Energy Conservation". This result shows an increase in public interest in these issues from previous years where these topics did not get much attention. Some of the key responses related to transportation are listed below:

1. **Idling:** When asked, "What is the City of Whitehorse's role with sustainability?" 25% of respondents listed anti-idling as a priority.

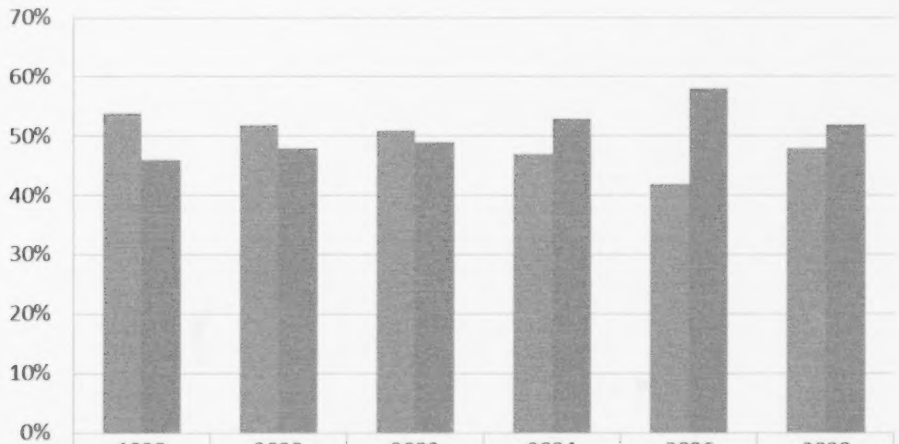
2. **Vehicle Emissions:** 71% of respondents did not list vehicle emissions as being a problem for them.

3. **Biking/Walking to Work:** 76% of respondents stated that safe storage lockers would not have any effect on their decision to bike more. 88% of respondents stated that bicycling/walking to and within downtown Whitehorse was 'Fair' to 'Excellent'.

4. **Parking:** 60% of respondents stated they were satisfied with the amount of parking downtown while shopping/visiting, but only 49% of the people surveyed who work downtown said they were satisfied with the amount of parking downtown during office hours. Of those respondents who work downtown and were dissatisfied with the level of parking available 37% stated that they would prefer to rent a stall (25% wanted power, 12% didn't want power); 43% stated that there was not enough parking within acceptable walking distances.

Further results of the survey's transit related questions are given below in Figures 16 through 18.

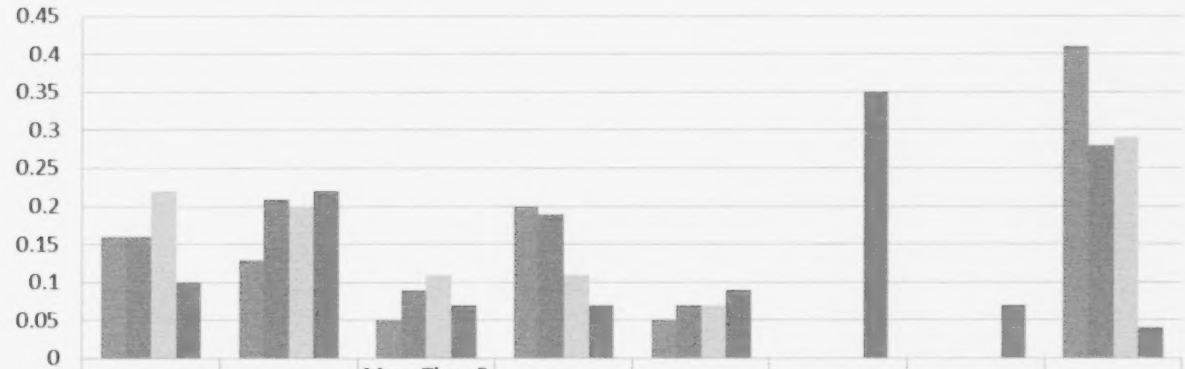
"Did You Or Any Member Of Your Family Use The Transit System In The Past Year, Excluding the Handy Bus?"



	1998	2000	2002	2004	2006	2008
Yes	54%	52%	51%	47%	42%	48%
No	46%	48%	49%	53%	58%	52%

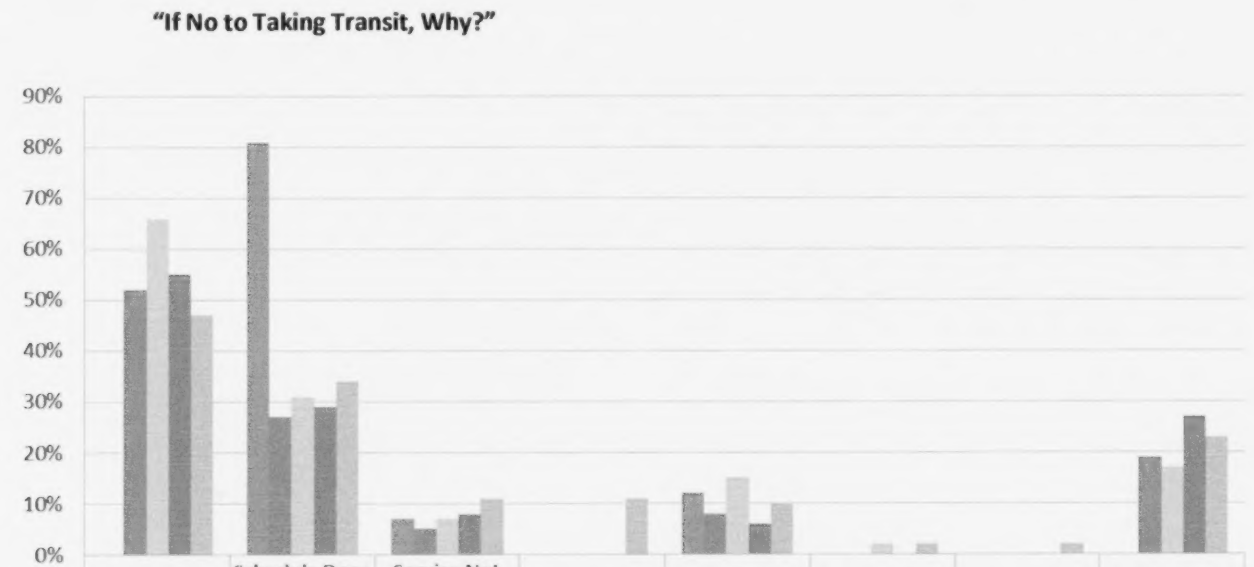
Figure 16: City of Whitehorse Citizen Survey

"If Yes to Taking Transit, How Often?"



	1-2 Days Per Week	3-5 Days Per Week	More Than 5 Days Per Week	1-2 Times Per Month	3-5 Times Per Month	Occasionally	More in Winter	Other Please Specify
2002	0.16	0.13	0.05	0.2	0.05	0	0	0.41
2004	0.16	0.21	0.09	0.19	0.07	0	0	0.28
2006	0.22	0.2	0.11	0.11	0.07	0	0	0.29
2008	0.1	0.22	0.07	0.07	0.09	0.35	0.07	0.04

Figure 17: City of Whitehorse Citizen Survey



	Prefer My Own Vehicle	Schedule Does Not Meet My Needs	Service Not Available in My Area	Walk to work	Takes Too Long	Fares Too High	Work at Home	Other, Please Specify
2000	0%	81%	7%	0%	12%	0%	0%	0%
2002	52%	27%	5%	0%	8%	0%	0%	19%
2004	66%	31%	7%	0%	15%	2%	0%	17%
2006	55%	29%	8%	0%	6%	0%	0%	27%
2008	47%	34%	11%	11%	10%	2%	2%	23%

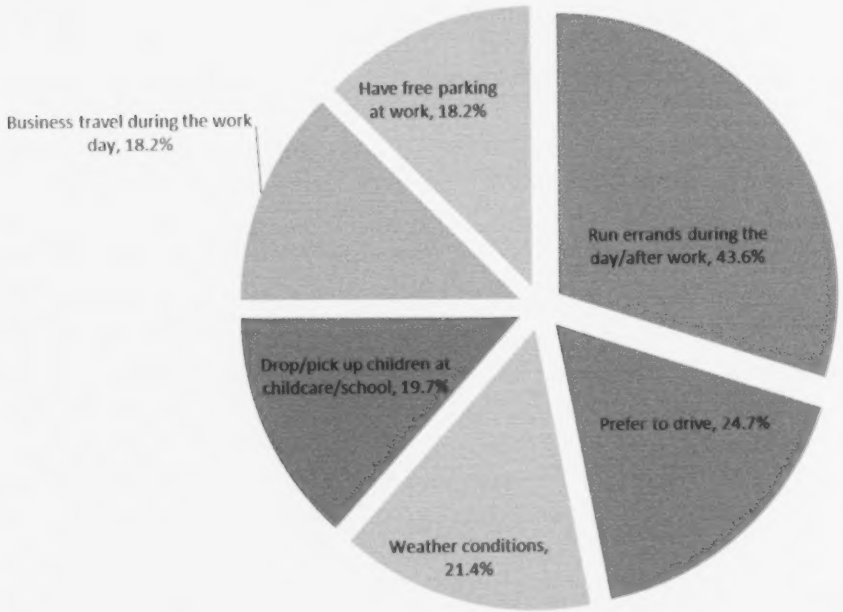
Figure 18: City of Whitehorse Citizen Survey

4.2. How Do You Get To Work? (2000)

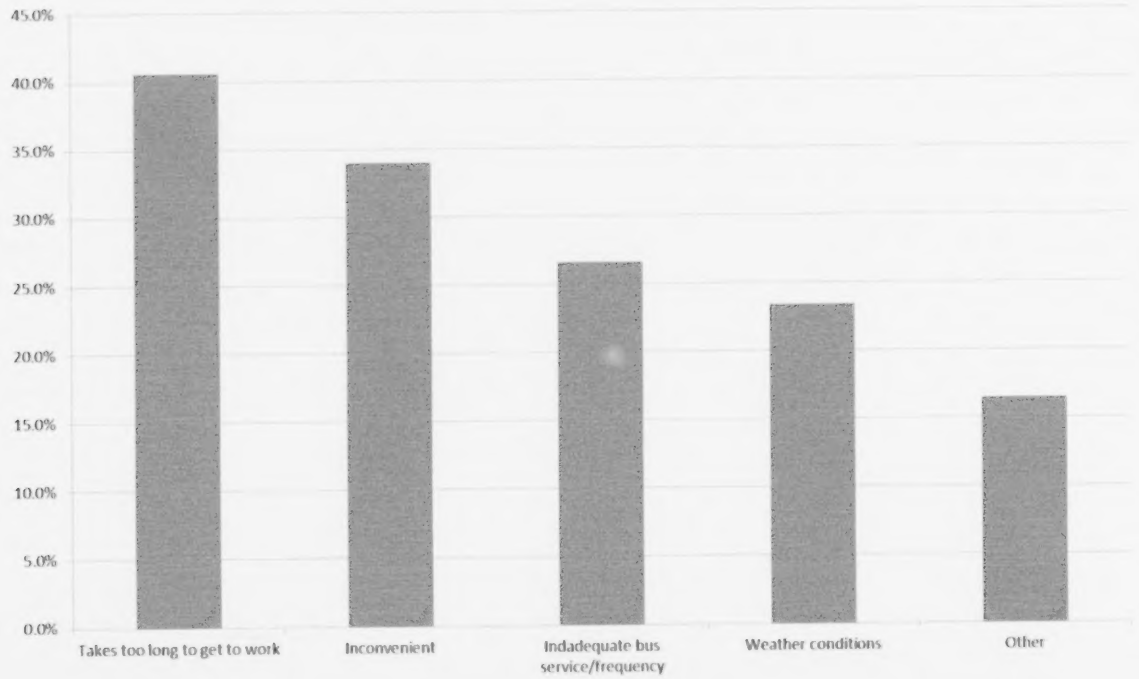
In 2000 the Yukon government's Public Service Commission undertook a survey focused on gaining a better understanding of the commuting habits of Yukoners. The survey was delivered to all the major employers in the territory and made available to the public.

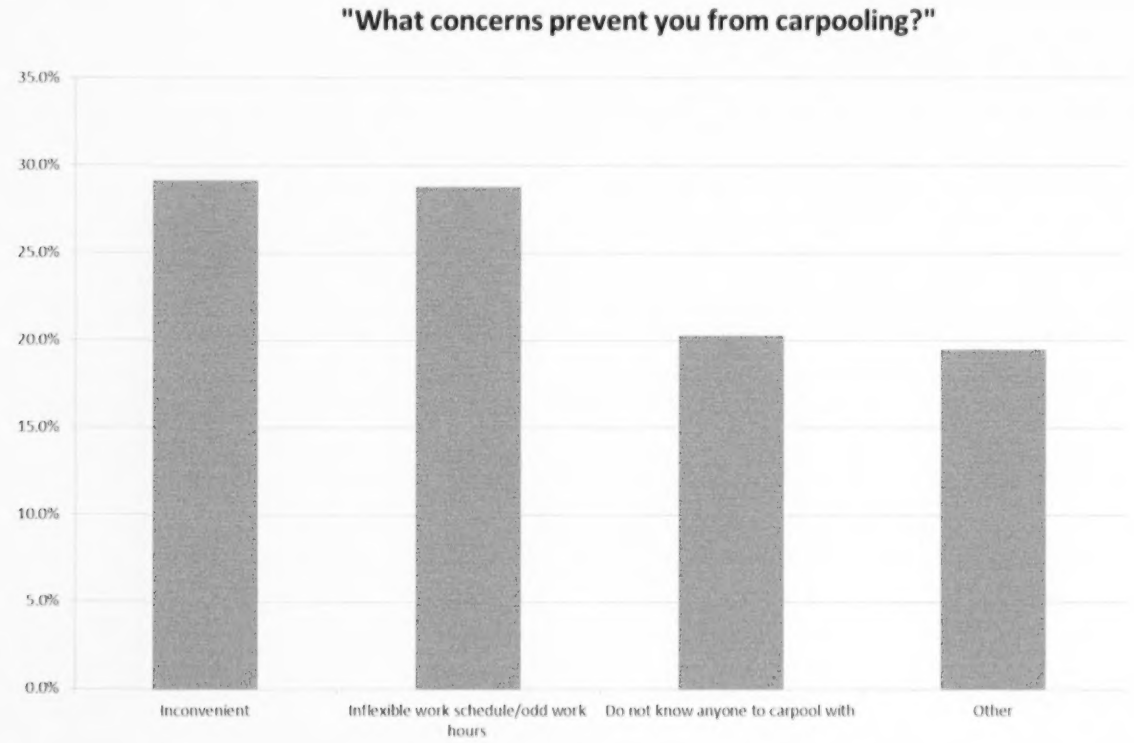
Some of the key results are given in the charts below.

"Why do you primarily drive your vehicle to work?"

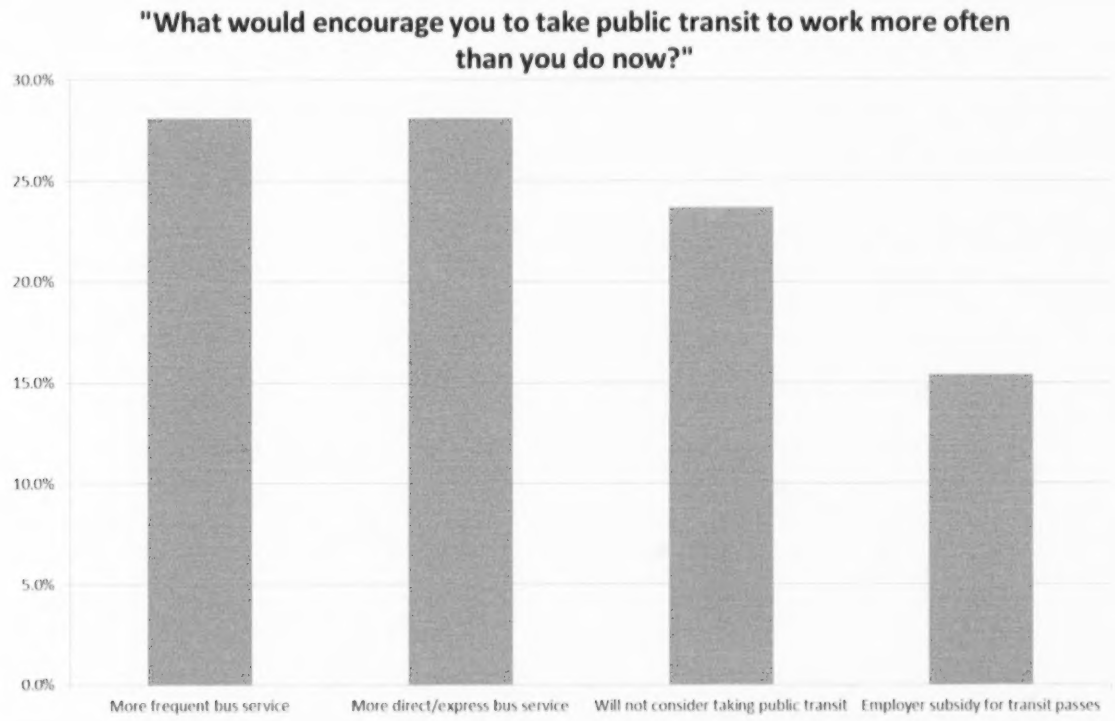

Have free parking at work, 18.2%
Business travel during the work day, 18.2%
Run errands during the day/after work, 43.6%
Drop/pick up children at childcare/school, 19.7%
Prefer to drive, 24.7%
Weather conditions, 21.4%

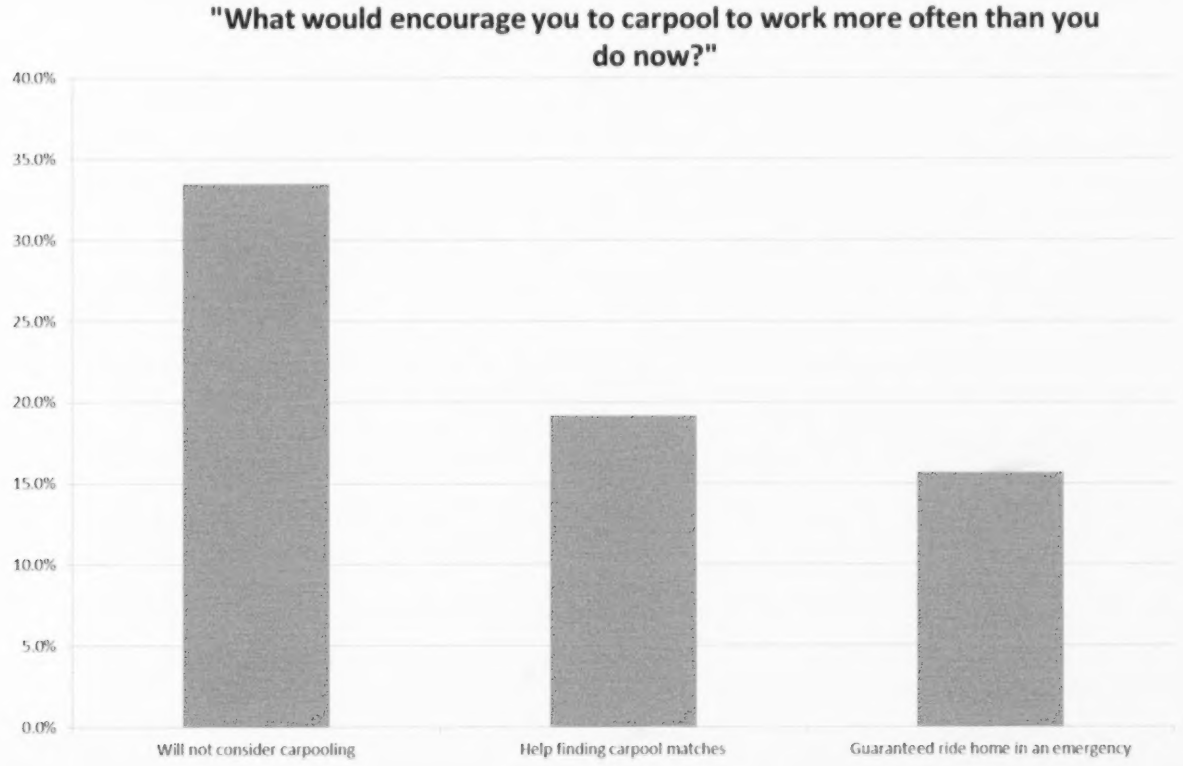
"What concerns prevent you from using the bus?"

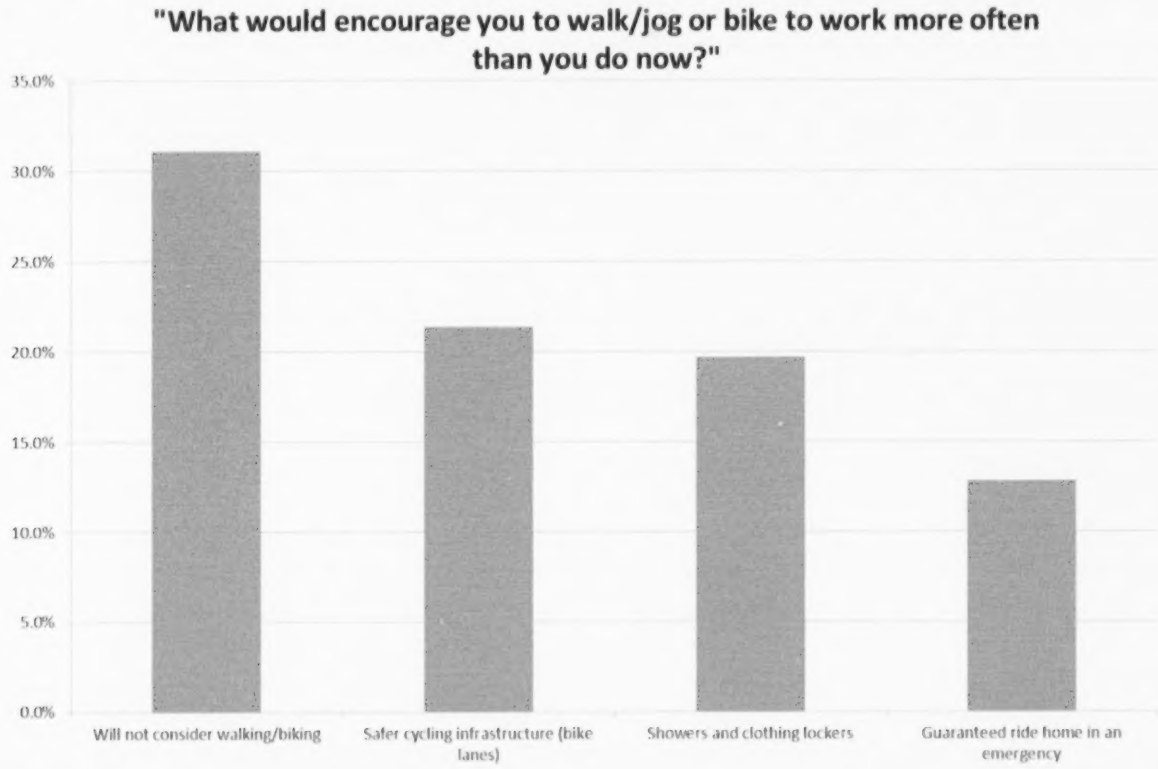



"What concerns prevent you from carpooling?"
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Inconvenient
Inflexible work schedule/odd work hours
Do not know anyone to carpool with
Other

"What concerns prevent you from walking/biking?"
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Comuting distance too great
Weather conditions
Takes too long
Lack of Showers at work
Other


"What would encourage you to take public transit to work more often than you do now?"
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
More frequent bus service
More direct/express bus service
Will not consider taking public transit
Employer subsidy for transit passes


"What would encourage you to carpool to work more often than you do now?"
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Will not consider carpooling
Help finding carpool matches
Guaranteed ride home in an emergency



5. Yukon Transportation Initiatives

Yukon transportation initiatives have included public transit initiatives and public education initiatives. The only long-term public transit initiative has been the development and expansion of the City of Whitehorse bus system. Private companies have from time-to-time offered inter-community bus service for the general public, but none of these are currently operating. Tour companies do offer inter-community bus transportation, but only to their clients. Greyhound Canada offers transportation into Yukon as far as Whitehorse and Alaska Direct Bus Line provides twice-weekly shuttle service from Whitehorse to Anchorage and Fairbanks.

The public education initiatives have included the City of Whitehorse studies mentioned previously, Yukon Government/Environment Canada vehicle emission clinics held in Whitehorse from 1998 to 2004, 2007 and 2009, in Haines Junction in 2001 and 2004 and in Dawson City in 2001 and 2004 and the annual Commuter Challenge week in Whitehorse hosted first by the City of Whitehorse in 2002 and then by the Recreation and Parks Association of Yukon from 2003 onward.

The City of Whitehorse has also made numerous improvements to its cycling network, and produced the City of Whitehorse Commuter Cycling Map. Bike carriers have also been added to the front of City of Whitehorse transit busses. Currently the City of Whitehorse is developing a Downtown Parking Management Plan.

6. Federal Transportation Initiatives

Various federal government agencies offer transportation–related programs aimed at increasing transportation efficiency and the availability and use of alternative fuels. These programs usually run for a distinct period of time and then are replaced or ended. Natural Resources Canada's Office of Energy Efficiency's website http://oee.nrcan.gc.ca offers longer-term information services on many energy efficiency transportation topics. These include the EnerGuide Label for all new light-duty vehicles sold in Canada, the Annual Fuel Consumption Guide for passenger and light-duty vehicles, the Fuel Consumption Rating Tool, Fuel Consumption Calculators, and resources for driver instructors and vehicle owners on how to teach new drivers and maintain and operate vehicles with energy efficiency in mind.

Federal programs that currently have funding are operated by Natural Resources Canada and Transport Canada.

Natural Resources Canada Programs http://fleetsmart.nrcan.gc.ca/

- ***ecoENERGY for Fleets*** is a program offered by Natural Resources Canada introducing fleets to energy-efficient practices that can reduce fuel consumption and emissions. ***FleetSmart*** is a component of this program offering free practical advice on how energy-efficient vehicles and business practices can reduce fleet operating costs, improve productivity and increase company competitiveness.

- ***Alternative Fuels Programs:*** the ***ecoEnergy for Biofuels Program***, which supports the production of renewable alternatives to gasoline and diesel and encourages the development of a competitive domestic industry for renewable fuels and the ***Next-generation Biofuels Fund*** which supports the establishment of first-of-a-kind large scale demonstration facilities for the production of next-generation renewable fuels and co-products.

- ***Educational Materials:*** NRCan also offers information on-line or in publications on topics ranging from fuel efficient driving to alternative transportation fuels.

Transport Canada programs http://www.tc.gc.ca/eng/programs/environment-ecotransport-menu-604.htm
Current Transport Canada Initiatives include:

- ***The ecoFREIGHT Program***, which is aimed at reducing the environmental and health effects of freight transportation through the use of technology.
- ***The ecoMOBILITY Program***, which will help municipalities reduce urban passenger transportation emissions by increasing transit ridership and the use of other sustainable transportation options.
- ***The ecoTECHNOLOGY for Vehicles Program*** which involves purchasing and testing a range of advanced technologies and showcasing them at public events across Canada.

Non-government, National Programs
Car Heaven
The Car Heaven Program, operated by Summerhill Impact is in all Canadian provinces, but none of the territories. This incentives-based program's objective is to transform Canada's personal vehicle fleet from older, more polluting vehicles to newer, less polluting vehicles.

7. Conclusions

It's clear from the high level of registered vehicles in the territory that Yukoners like their cars; however, those cars come with economic and environmental costs. It's evident from survey data that the Yukon public has a growing awareness of these costs; however, this awareness alone has not, as yet resulted in less private vehicle usage. Tools typically used by government to reduce energy consumption/costs in the transportation include: public education, targeted programming, policy, regulation or a combination of some or all of these.

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